

CURRICULUM GUIDE

for

IDAHO

NETWORKING TECHNOLOGY

**IDAHO STATE DIVISION OF
PROFESSIONAL-TECHNICAL EDUCATION**

**650 W. State Street
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INTRODUCTION

Curriculum

The goal of the curriculum committee was to develop a state-of-the-art program and curricula entitled, "Idaho Networking Technologies" (INT), which will be the revised Idaho secondary program for network professional-technical training. In doing so, the committee created a program which is to be delivered statewide with local curriculum choices meeting the needs of students, institutions of higher education, school districts, and business and industry. This document is to be viewed as an ongoing technical reference manual that needs to be updated frequently.

Technological advances will dictate the addition of new materials and deletion of outdated materials as time progresses. Therefore, this curriculum was designed using the latest modules from Novell, Microsoft, A+ and Cisco as the curriculum base. As the industry leaders release new versions of software and training materials, the curriculum will be updated accordingly.

Program Goal

In addition to obtaining a postsecondary and/or secondary diploma, the goal of the INT program is to provide secondary and postsecondary students with the opportunity to certify in a field where demand and salary opportunities for highly trained professionals is unsurpassed. According to Gay Robbins of Microsoft and Kent Christensen of Novell, the unfilled demand for Information Technology (IT) workers in the next five years will exceed 650,000 positions nationally. Students who have completed an IT program can expect starting salaries commensurate with those earned by engineers and other technical professionals.

Computer Education Philosophy

The concept of computer education in Idaho's schools is based on the need for all students to obtain an adequate level of competency in the use and understanding of computers. This understanding goes far beyond the classroom walls and should be integrated with and applicable to everyday situations. Network Technology goes beyond the computer education philosophy to extend the potential of Idaho students in meeting future needs.

INT Secondary Program

The INT Secondary Program will have a targeted focus on networking technologies. The recommended program sequence is as follows:

Network Technologies - Recommended Program (Semester)

| 10 th Grade | | 11 th Grade | | 12 th Grade | |
|---|---|------------------------|------------|------------------------------|------------|
| Semester 1 | Semester 2 | Semester 1 | Semester 2 | Semester 1 | Semester 2 |
| 90 Hours | 90 Hours | 90 Hours | 90 Hours | 180 Hours | 180 Hours |
| Core A+ Networking Plus TST Options | Core A+ Networking Plus TST Options | CISCO 1, 2 CCNA | | CISCO 3,4 CCNA/Sr. Project | |
| | | NOVELL CNA | | Sr. Project /Work Experience | |
| | | MICROSOFT MCP | | Sr. Project /Work Experience | |
| | | OTHER (Industry Cert) | | Sr. Project /Work Experience | |
| Support Experience (Network and Application)/Mentor Program | | | | | |

Network Technologies - Recommended Program (Trimester)

| 10 th Grade | | | 11 th Grade | | | 12 th Grade | | |
|---|-------------------------------------|-------------------------------------|------------------------|----------|----------|------------------------------|-----------|-----------|
| Tri -1 | Tri - 2 | Tri - 3 | Tri -1 | Tri - 2 | Tri - 3 | Tri -1 | Tri - 2 | Tri - 3 |
| 75 Hours | 75 Hours | 75 Hours | 75 Hours | 75 Hours | 75 Hours | 150 Hours | 150 Hours | 150 Hours |
| Core A+ Networking Plus TST Options | Core A+ Networking Plus TST Options | Core A+ Networking Plus TST Options | CISCO 1, 2 CCNA | | | CISCO 3,4 CCNA/Sr. Proj. | | |
| | | | NOVELL CNA | | | Sr. Project /Work Experience | | |
| | | | MICROSOFT MCP | | | Sr. Project /Work Experience | | |
| | | | OTHER (Industry Cert) | | | Sr. Project /Work Experience | | |
| Support Experience (Network and Application)/Mentor Program | | | | | | | | |

Network Technologies - Recommended Program (8-PRO Schedule)

| 10 th Grade | | 11 th Grade | | 12 th Grade | |
|---|---|------------------------|------------|------------------------------|------------|
| Semester 1 | Semester 2 | Semester 1 | Semester 2 | Semester 1 | Semester 2 |
| 90 Hours | 90 Hours | 90 Hours | 90 Hours | 180 Hours | 180 Hours |
| Core A+ Networking Plus TST Options | Core A+ Networking Plus TST Options | CISCO 1, 2 CCNA | | CISCO 3,4 CCNA/Sr. Project | |
| | | NOVELL CNA | | Sr. Project /Work Experience | |
| | | MICROSOFT MCP | | Sr. Project /Work Experience | |
| | | OTHER (Industry Cert) | | Sr. Project /Work Experience | |
| Support Experience (Network and Application)/Mentor Program | | | | | |

Note: For funding purposes, a full-time program would consist of four periods per day. A part-time program would consist of two periods per day.

TST Area Specific Courses:

Courses offered as TST programs (HTML, Programming, Video, Telecommunications, and computer repair) can be offered during the Sophomore year as core classes. ***NOTE: Computer application and keyboarding classes should not be included in the Core.***

Senior Project Suggestions:

Novell and Microsoft Advanced Administration
Unix/Linux Systems Administration
HTML/Web Development
OS/2 Systems Administration
Programming (C++ , Visual Basic, other)
Wiring/Cabling and Backbone Maintenance
Work Experience/Customer Support/Internship
Oracle database
Microsoft SQL
Other

- The Core Class is recommended for two semesters or three trimesters of the student's Sophomore year. This course may be combined with computer support experiences in the school, thereby providing an initial support structure for the district's basic repair, configuration and application needs.
- During the Junior year, one or more of the choices (Novell, Cisco, Microsoft or other industry certification) may be offered. This course may be combined with computer support experiences in the school, thereby providing support for the district's technology maintenance needs.
- The Senior year, a continuation of the CISCO program (semesters 3 and 4) or

a Senior project and work-based experiences may be offered. The Senior projects should have a direct bearing on the student's training in Novell, Microsoft or CISCO training, and lead to a mutually agreed upon outcome. The work-based experience should be off-campus, if possible, to help the student practice customer satisfaction as well as develop technical skills. In order to provide sufficient time on task for skill development this course offering should be delivered through a multiple class period for a full year (see Unit Four for more information).

INT Postsecondary Program

Programs for Networking Technologies have been developed at the postsecondary level to assure the INT student a smooth transition into the Idaho technical college of their choice. All six Idaho technical colleges will offer either dual-enrollment, articulated, or dual credit through Tech-Prep or other venues. Upon graduation from the secondary system, the student should have had the opportunity to earn college credit for classes, as well as an initial certification in either Novell (CNA), Microsoft (MCP), or CISCO (CCNA). Postsecondary institutions will offer one, or a combination of, the follow up certifications in Novell (CNE), Microsoft (MCSE), and possibly CISCO (CCNP) in addition to an A.A.S. degree.

INT Program Rollout

The State Division of Professional-technical Education realizes that it may not be reasonable to expect current TST programs to convert to INT programs in a short period of time. Therefore, to aid in the rollout of the INT program, the Division has determined a time period not to exceed three years, for all instructors to gain the necessary vocational and industry certifications and to schedule courses as required (see information on Instructor Certification).

Instructor Certification Information

Computer education in the Public Schools continues to be an evolving process. Change is one component of technology that is certain. Commitment to change by students, teachers, and administrators is critical to the continued success of the program. Therefore, the INT program should be staffed by certified personnel who have demonstrated a commitment to obtain industry certifications and keep those certifications current. The following certifications apply:

Vocational Certification – The instructor of the INT program must be vocationally certified. A three-year, non-renewable, interim certificate can be issued to qualified instructors who do not currently hold a vocational certification. During the three years granted by the Division, the instructor will be expected to finish the vocational certification process.

Industry Certification – There are three ways to fulfill this requirement:

1. If an instructor can demonstrate eight years of industry experience, he/she may qualify for certification.
2. If the instructor has a Bachelor's degree in the teaching area, and three years of industry experience, he/she may qualify. A question that is often asked is,

“If a teacher is working as a support technician or district network system administrator, would that qualify for the three years?” The answer is “yes” if the experience is directly related to the content of the class. The instructor will be required to document the relationship.

3. For those who cannot meet the industry requirement of eight years, if the individual can provide evidence of an industry-based certification (CNA, MCP, MCSE, CNE, CCNA, MCT, CNI, A+ and Network+), that evidence may substitute for part of the industry experience. Certification costs are solely the responsibility of the instructor or school district.

Unit One - Computer Systems, Core Courses

A+

Course Description: The purpose of this course is to provide students with the basic skills required to become network technicians. Content will include installing, configuring, diagnosing, networking concepts, and safety issues which will provide a base knowledge of networking support commonly used in business applications.

Objective 1- Installation, Configuration and Upgrading

- Identify basic terms, concepts, and functions of system modules, including how each module should work during normal operation. Examples include: system board, power supply, CPU/Microprocessor, memory, storage devices, monitor, modem, firmware, boot process, BIOS, CMOS.
- Identify basic procedures for adding and removing field replaceable modules. Examples include: power supply, CPU/Microprocessor, memory, storage devices, Input devices and standard IRQ settings.
- Identify available IRQ's DMA's and I/O addresses with procedures for configuring them for device installation. Examples include: modems, floppy drives, and hard drives.
- Identify common peripheral ports, associated cables, and their connectors. Examples include: cable types, connection orientation, serial vs. parallel and pin connections.
- Identify proper procedures for installing and configuring IDE/EIDE devices. Examples include: devices per channel, address/termination conflicts.
- Identify proper procedures for installing and configuring SCSI devices. Topics include: cabling, internal vs. external, switch and jumper settings, monitor and video card.
- Identify proper procedures for installing and configuring peripheral devices. Topics include: modem, storage devices, and methods for upgrading.
- Identify procedures for upgrading BIOS and when to upgrade memory.
- Identify hardware methods of system optimization and when to use them. Examples include: hard drives, CPU/microprocessors, cache memory.

Objective 2 - Diagnosing and Troubleshooting

- Identify common symptoms and problems associated with each module and how to troubleshoot and isolate problems. Contents may include: processor/memory symptoms, keyboards, mouse, trackball, touch pads, microphones, parallel ports, floppy drives, hard drives, sound cards, audio cards, monitor, video, motherboards, modems, BIOS, CMOS, power supply, slot covers, POST error codes, troubleshooting tools.
- Identify basic troubleshooting procedures and good practices for eliciting problem symptoms from customers. Topics include: troubleshooting, isolation, problem solving and determination if a problem is hardware or software specific, etc.

Objective 3 - Safety and Preventive Maintenance

- Identify the purpose of various types of preventative maintenance products and procedures, and when to use/perform them. Examples include: liquid cleaning compounds, contact and connection cleaning solutions, vacuum systems and power supplies.
- Identify procedures and devices for protecting against environmental hazards.
- Identify the potential hazards and proper safety procedures relating to lasers and high voltage equipment.
- Identify items that require special disposal procedures that comply with environmental guidelines. Examples include: batteries, toner kits, chemical solvents, CRTs.
- Identify ESD precautions and procedures, including the use of ESD devices.

Objective 4 - Motherboards, Processors, and Memory

- Distinguish between the popular CPU chips in terms of their basic characteristics such as size, voltage, speed, cache, sockets, and number of pins.
- Identify the categories of RAM terminology, locations, and physical characteristics. i.e., EDO, DRAM, SRAM, VRAM, WRAM, SIMMS, DIMMS, Parity, etc.
- Identify the most popular type of motherboards, their components, and their architecture, AT, AXT, communication ports, SIMM, DIMM, processor socket, external cache, ESA, EISA, PCI, USB, VESA, and PCMCIA.
- Identify the purpose of CMOS, what it contains and how to change its basic parameters. Examples include: parallel port, com and serial ports, hard drive, floppy drive, boot sequence, memory, passwords, and date and time.

Objective 5 - Printers

- Identify basic concepts, printer operations, printer components, and field replaceable units in primary printer types: laser, inkjet, dot-matrix.
- Identify the types of printer connections and configurations: parallel,

serial, and network.

Objective 6 - Portable Systems

- Identify the unique components and problems of portable systems. Examples include: battery, LCD, AC adapter, docking stations, hard drive, type I, II, III cards, network cards, etc.

Objective 7 - Networking

- Identify basic networking concepts including operations. Examples include: protocol, NICs, cabling, and duplexing.
- Identify ramifications of repairs on networks. Examples include: bandwidth issues, loss of data and network slowdown.
- Identify procedures to install and configure NICs.

Objective 8 - Customer Satisfaction

- Differentiate “effective” from “ineffective” behaviors regarding the achievement of customer satisfaction. Examples include: communicating and listening, verbal and non-verbal cues, responding to the customer’s technical level, professional conduct, closing a service call, handling complaints, etc.

Objective 9 - DOS/Windows - Function, Structure, Operation and File Management

- Identify the operating system’s functions, structure, and major system files. Examples include: Functions of DOS, Windows 3.x and Windows 95/98.
- Major components of DOS, Windows 3X and Windows 95/98.
- Contrasts between 3X, 95 and 98
- Describe major system files: what they are, where they are located and how they are used. Examples include: autoexec.bat, config.sys, io.sys, ansi.sys, msdos.sys, command.com, himem.sys, win.ini, system.ini, progman.ini, regedit.exe. System.dat, etc.
- Differentiate between types of memory. Examples include: conventional, extended, high, expanded and virtual.
- Identify typical memory conflict problems and how they optimize memory use. Examples include: conflicts, system monitors, GPFs, Illegal operations, etc.
- Identify the procedures for installing DOS, Windows, 3X, Windows 95/98 and bringing the software to a basic operational level. Examples include: partition, format hard drive, setup utility, and drivers.
- Identify steps to perform an operating system upgrade. Topics include: DOS to Windows. Windows 3x to 95, Windows 95 to 98.
- Identify the basic system boot sequence and alternative ways to boot the system software, including steps to create an emergency system boot disk. Examples include safe mode, normal mode, DOS mode, etc.
- Identify procedures for loading/adding device drivers and the necessary software for devices i.e., Windows 3x procedure and plug

and play.

Objective 10 - Diagnosing and Troubleshooting

- Recognize and interpret the meaning of common error codes and startup messages from the boot sequence and identify steps to correct the problem.
- Recognize Windows-specific printing problems and identify the procedures for correcting them.
- Recognize common problems and determine how to solve them. i.e., GPFs, illegal operations, invalid working directory, system lockups, etc.
- Identify concepts relating to viruses and virus types - their danger, their symptoms, sources, how they infect, and how to protect against them.

Objective 11 - Networks

- Identify the networking capabilities of DOS and Windows including the procedures for connectivity, sharing disk drives, sharing print resources, network type and cards.
- Identify concepts and capabilities relating to the Internet and basic procedures for setting up a system for Internet access. Topics include: TCP/IP, email, HTML, HTTP, FTP, DNS, ISP, and dial-up.

Required Equipment for A+ Program (Subject to change without notice):

- 166+ MHz MMX Pentium Microprocessor with fan
- Pentium System Board
- FDD Mounting Kit
- 2.1 GB+ IDE HDD with Installation Kit
- 8MB Ram upgrade
- Windows 98/95 Win 3.X/MS DOS 6.22
- Marcraft Hardware/Software Fault Set
- Serial Loopback Plug
- Parallel Loopback Plug
- Monitor Adapter Cable
- CheckIT Diagnostic Software
- Postcard Diagnostic Software
- PC-Check Professional Diagnostic Software
- Video Driver Disk
- 101- Key Keyboard
- Floppy Disk Drive 3.5 inch, 1.44 MB
- Serial Adapter (25-pin to 9-pin)
- Power Cable - 110 V
- Cabling Set
- Full Tower Case with easy access, 8 bays and 230W Power Supply
- 14" SVGA Monitor, 28dpi, Non-interlaced
- 3-button mouse
- SVGA Card 1- MB RAM
- 24X+ CD-ROM Drive
- Student Courseware Set

Network Plus:

Curriculum for Network Plus will be released by CompTIA before the 1999-2000 school year.

Expected Student Outcomes:

- A+ Certification
- Student Certification - Although we highly recommend that the students obtain the entry level certifications at the high school level, they are not required. Because of the costs involved with certification, a student may choose to take the class, complete the required work and not certify.
- Testing - Testing may be done at any Sylvan or Prometric testing center. Each technical college in the state will eventually offer testing as a part of IT programs.

Unit Two-Network Operating Systems (NOS), Professional-Technical Training

Option 1: Microsoft NT NOS

Course Description

- Overview of Windows NT directory services
- Domains
 - Logging onto a computer or domain
- Installing and configuring NT
 - Server based install
 - Upgrading
 - Removing NT
 - Registry
 - Control Panel
 - Client installation and administration
- Managing users and groups
 - User profiles
 - Trusts
 - Trusted relationships
- Account administration
 - Administration
 - System policies
- Securing network resources
 - Securing network resources with permissions (shared folder and NTFS)
 - Security interactions
- Managing network resources
 - Managing servers
 - Managing domains
 - Partitions
 - Fault tolerance
 - TCP/IP
 - NWLink
 - NetBEUI
 - DHCP
 - DNS
 - WINS
 - Viewing the system configuration
- Peripheral support
 - Creating printers
 - Administering printers
 - RAS (dial-up network)
- Auditing resources
 - Auditing events
 - Auditing files and directories
 - Auditing printers
- Backup and recovery
 - Backing up and restoring files
- Other

- IIS (Inter- and Intranets)

MCP/MCSE Industry Certification

Industry suggests that for the MCP Certification a student complete the **MS-803 and MS-922 courses**. Additional courses listed are offered for the MCSE.

Group One (Select One)

- MS-798 Supporting Microsoft Windows
- MS-803 Administering NT 4.0
- MS-922 Supporting NT 4.0 Core Technologies

Group Two (Select One)

- MS-803 Administering NT 4.0
- MS-922 Supporting NT 4.0 Core Technologies

Group Three (Select Two)

- MS-689 Supporting NT Server 4.0 Enterprise Technologies
- MS-578 Networking Essentials

Group Four (Select Two)

- MS-868 Implementing and Supporting MS Exchange Server 5.0
- MS-867 System Administration for MS SQL Server 6.5
- MS-750 Implementing a Database Design on MS SQL Server 6.5
- MS-688 Internetworking TCP/IP on MS NT 4.0

MCSE Certification Exams:

(Choose 4)

Exam 70-058: Networking Essentials

Exam 70-067: Implementing and Supporting Microsoft Windows NT Server 4.0

Exam 70-068: Implementing and Supporting Microsoft Windows NT Server 4.0 in the Enterprise

Exam 70-064: Implementing and Supporting Microsoft Windows 95

Exam 70-073: Microsoft Windows NT Workstation

Exam 70-098: Implementing and Supporting Microsoft Windows 98

Elective Exams: <http://www.microsoft.com/mcp/certstep/mcse.htm#40>

(Choose 2)

INT Secondary Program Certification

The MCP certification is recommended, but not required for all secondary students. The courses that will be offered in the INT program will include the MS-803 and MS-922 (see Group Two, page 10). When completed the student should have the necessary knowledge and skill to pass the MCP certification test.

Program Required Equipment -

- No dedicated Server required for this class
- The instructor's workstation should be partitioned and configured to boot as a server and workstation. The instructor's workstation should have a minimum of 64 MB RAM and a 3GB HDD.
- One Student per PC
- 486-66 student workstations with NT Server loaded on each machine. Each student workstation should have a minimum of 16 MB RAM (32 recommended, 500 MB HDD space, 3.5 floppy drive, mouse, network connection.
- The PC hardware must be listed on the hardware compatibility list.

Expected Student Outcomes

- Student Certification - Although we highly recommend that the students obtain the entry level certifications at the high school level, they are not a requirement. Because of the costs involved with certification, a student may choose to take the class, complete the required work and not certify.
- Testing - Testing may be done at any Sylvan or Prometric testing center. Each technical college in the state will eventually offer testing as a part of their IT programs. The MCP certification has two tests: the NT Workstation Exam 70-67 and the NT Server Exam 70-73. The rate to pass the exam is reported at between 70% -78%.

Option 2: Novell NetWare NOS, Novell NetWare 520

Course Description

Learn the basics of managing a NetWare 4 network. Course 520 teaches how to use NetWare administrative tools to set up, manage and use basic network services, including file systems, network printing, security and email.

The following is a comprehensive outline of the 520 course:

- Introduction and overview of IntraNetWare
 - Administrator responsibilities
 - Network resources and services
 - NDS
 - The directory tree
- Enabling network access
 - IPX/IP
 - Client 32 Overview
 - Login concepts
 - Browser client installation
- Managing user accounts
 - Introduction to user object management
 - NWAdmin and creating user accounts
 - Licensing
 - Network Security
- Managing network printing
 - Overview
 - Distributed print services (setup, maintenance, and managing)
- Managing the file system
 - Introduction to file management
 - File system utilities
 - Managing the directory structure
 - Managing volume space
- Managing security
 - File system security
 - Login scripts
- Configuring network applications for users
 - Network application launcher
- Managing NDS security
 - NDS security introduction
 - NDS rights and assignments
- Installation and configuration
 - Overview
 - Simple and custom installations
 - GUI installation utility

Option 2: Novell NetWare NOS, Novell 560

Course Description

This course is designed to provide the knowledge and skills necessary to perform competently in the role of network administrator or system manager for NetWare 5.

The following topics are taught in addition to those items already listed in the 520 course:

- Describe a NetWare 5.0 network, including the physical components and functions.
- Describe the NetWare 5.0 services available on the network and role of NDS.
- Access the network from a workstation by installing, configuring, and using the client.
- Execute an application from the network and install a browser client.
- Create user objects for new users.
- Manage user network access through NetWare user licenses.
- Set up, login, and security for user object.
- Set up and manage Novell Distributed Print Services on a network.
- Identify the components of a network file system.
- Create effective file system security.
- Create login scripts for NDS objects.
- Map network and search drives using login scripts.
- Use the login utility to edit login scripts.
- NDS security, default rights assignments, and guidelines for managing security.
- Perform NDS security tasks.
- Distribute network applications to workstations.
- Remote management of workstations
 - ZenWorks desktop management utility
 - Remote control access utility
 - Workstation object
 - Configuring remote access
 - Synchronizing workstation with its NDS object
- Workstation manager
 - Installing and configuring multiple clients
 - Managing workstation inventory
 - Managing profiles and policies
 - Scheduling upgrades
 - Configuring printers and print queues dynamically
 - Setting user interface properties

CNA Certification

The Certified NetWare Administrator certification is the first step toward the Certified NetWare Engineer (CNE). The CNA requires the student to complete the 520 course and pass a certification test.

Industry CNE Certification

Industry suggests that the student to complete the Novell NetWare 520 Administration course to test for the CNA. The remainder of the courses listed are suggested classes for the CNE.

565

Networking Technologies

520

IntranetWare Administration

525

IntranetWare Advanced Administration

804

IntranetWare Installation and Configuration

575

IntranetWare Design and Implementation

580

Service and Support

**540 Building Intranets with IntranetWare
Elective**

INT Secondary Program Certification

Students who are enrolled in the INT program, Novell Option, will take the Novell 520 class to prepare for the CNA certification exam. Other classes listed above will be offered at the Postsecondary level for advanced certificates such as the CNE or

CNI.

Required Equipment for the NEAP Program

Novell 520/560 Class:

- Level 2 Classroom
- Maximum of 2 students per workstation.
- Workstations configuration should be NT or Windows 95/98
- A minimum of 12 student workstations, 586-133 MHz loaded with 32-bit client, Windows 95/98, minimum 16MB RAM, 15MB HDD space 6X CD-ROM, SVGA monitor, mouse, network board and cabling.
- One dedicated Server with a minimum 64MB RAM, 2GB HDD space.
- One instructor workstation

Expected Student Outcomes

- Student Certification - Although we highly recommend that the students obtain the entry-level certifications at the high school level, they are not a requirement. Because there are costs involved with certification, a student may choose to take the class, complete the required work and not certify.
- Testing - Testing may be done at any Sylvan or Prometric testing center. Each technical college in the state will eventually offer testing as a part of their IT programs. To obtain the CNA certificate the student must pass the CNA exam with a 82.0% or greater.

Unit Three - Network Connectivity

Course Description

This course is designed to give students the opportunity to learn the skills needed to design, build, and maintain small to medium-size networks. This training will provide them with the opportunity to enter the workforce and/or further their education and training in the computer networking field.

CISCO, CCNA

Semester 1

- Identify and describe the functions of the OSI model.
- Describe data link and network addresses and identify key differences between them.
- Define and describe the function of a MAC address.
- List the key internetworking functions of the OSI network layer.
- Identify at least three reasons why the industry uses a layered model.
- Describe the two parts of network addressing, then identify the parts in specific protocol address examples.
- Identify the functions of each layer of the ISO/OSI reference model.
- Define and explain the five conversion steps of data encapsulation.
- Describe the different classes of IP addressing [and subnetting].
- Identify the functions of the TCP/IP network-layer protocols.

Semester 2

- Examine router elements (RAM, ROM, CDP, show).
- Describe connection-oriented network service and connectionless network service, and identify their key differences.
- Define flow control and describe the three basic methods used in networking.
- Identify the functions of the TCP/IP transport-layer protocols.
- Manage configuration files from the privileged exec. mode.
- Identify the functions performed by ICMP.
- Control router password identification and banner.
- Identify the Cisco main IOS software commands for router startup.
- Check an initial configuration using the setup command.
- Log in to a router in both user and privileged modes.
- Use the context-sensitive help facility.
- Use the command history and editing features.
- List the commands to load CISCO IOS software from flash memory, a TFTP server, or ROM.
- Prepare to backup, upgrade, and load a backup CISCO IOS software image.
- Identify the parts in specific protocol address examples.
- List problems that each routing type encounters when dealing with topology changes and describe techniques used to reduce the number of these problems.
- Configure IP addresses.
- Verify IP addresses.
- Prepare the initial configuration of a specified router and enable IP.

- Add the RIP routing protocol to a specific configuration.
- Add the IGRP routing protocol to a specific configuration.
- Configure standard access lists to filter IP traffic.
- Monitor and verify selected access list operations on the router.
- Configure extended access lists to filter IP traffic.
- Monitor and verify selected access list operations on the router.

Semester 3 (optional)

- List the required IPX address and encapsulation type.
- Configure IPX access lists and SAP filters to control basic Novell traffic.
- Enable the Novell IPX protocol and configure interfaces.
- Monitor Novell IPX operation on the router.
- Describe the advantages of LAN segmentation.
- Describe LAN segmentation using bridges.
- Describe LAN segmentation using routers.
- Describe LAN segmentation using switches.
- Name and describe two switching methods.
- Describe full- and half-duplex Ethernet operation.
- Describe network congestion problem in Ethernet networks.
- Describe the benefits of network segmentation with bridges.
- Describe the benefits of network segmentation with routers.
- Describe the benefits of network segmentation with switches.
- Describe the features and benefits of Fast Ethernet.
- Describe the guidelines and distance limitations of Fast Ethernet.
- Distinguish between cut-through and store-and-forward LAN switching.
- Describe the operation of the Spanning Tree Protocol and its benefits.
- Describe the benefits of virtual LANs.

Semester 4 (optional)

- Differentiate between the following WAN services: LAPB, Frame Relay, ISDN/LAPD, HDLC, PPP, DDR.
- Recognize key Frame Relay terms and features.
- List commands to configure Frame Relay LMI, maps, and sub-interfaces.
- List commands to monitor Frame Relay operation in the router.
- Identify PPP operations to encapsulate WAN data on CISCO routers.
- State a relevant use and context for ISDN networking.
- Identify ISDN protocols. Function groups, reference points, and channels
- Describe CISCO's implementation of ISDN BRI.
- Complete work experience/projects/internships.

Program Required Equipment

CISCO Local Academies must:

- Maintain an active e-mail and 56KB dedicated Internet connection.
- 900 Square Feet of space for the lab.
- Must have no more than three students to a computer in the classroom with the following minimum system requirements: Windows 95, Netscape 3.0 or

- later/IE 4.0 or later .
- Java Script enabled, with a Quicktime plug-in and Macromedia Shockwave plug-in.
- Minimum 486, 24MB RAM, 10MB HDD space, 800x600 resolution display, 10 BaseT Ethernet card, CD-ROM drive, mouse, sound card, speakers and headphones.

| Lab Equipment |
|--|
| Cisco Ethernet/Serial Modular Router |
| Cisco 1601-1604 4MB to 6MB Flash Factory Upgrade |
| Cisco 1601-1604 2MB to 4MB DRAM Factory Upgrade |
| Cisco 1601-1604 IOS IP/IPX/AT PLUS |
| 1-Port Serial WAN |
| MALE DTE V35 CAB 10 FT Interface Card |
| FEM DCE V35 CAB 10 FT |
| Cisco 1600 AC Power Supply |
| Cisco 2500 2E2T |
| Power Cord, 110V |
| Cisco IOS 2500 Series IP/IPX/AT/DEC Plus |
| 8MB DRAM SIMM |
| 24 Port 10Mb Switch W/2 100BaseTX Ports; Ent Ed Upgradable |
| 12 Port 10Mb Switch 2 100BaseTX Ports, ISL, CGMP, RMON |

Expected Student Outcomes

Student Certification/Testing - Students who complete the CISCO Courses and tests will be qualified as a CISCO Certified Network Administrator (CCNA).

Unit Four - Work-Based Experience

Work-based experience is a part of Idaho's broader effort to educate young people and adults. In vocational education, the term "work-based learning" is defined as experience at a worksite based upon a career/educational plan and connected to school-based learning. There are many types and variations of work-based learning opportunities. The options a student has (relating to information technology) include:

- Cooperative Education - Cooperative education integrates classroom study and paid work, balancing classroom theory with career-related experience. In cooperative education, teachers, and employers jointly identify the competencies to be taught in the classroom and at the worksite. They develop a plan that guides the student's training. The plan lists student competencies, including rules, regulations, requirements, and/or responsibilities of the student, parent, worksite sponsor and teacher/coordinator. The distinguishing characteristics of Cooperative education include:
 1. Technical content instruction is shared by the teacher and worksite mentor.
 2. Paid work experience.
 3. It is commonly part of all vocational programs.
- School-To-Apprenticeship - The school-to-apprenticeship linkage is an innovative approach to education and training which allows qualified high school students to effectively bridge the gap between high school and the traditional apprenticeship system. High school students who meet the requirements for entry into the program are employed part-time as apprentices while completing their secondary education. Upon completion of required courses for high school graduation, student-apprentices are expected to continue in the program as full-time apprentices.

Distinguishing characteristics of the school-to-apprenticeship include:

 1. Technical content instruction by worksite mentor/sponsors.
 2. Paid or unpaid work experience.
 3. Involvement with trade and vocational programs.
- Individualized Occupational Training - The IOT program is a new, stand-alone vocational program which will provide work-based learning experiences to fit an individual student's career. Requirements for this program include:
 1. A semester-long course in career development.
 5. Selection of worksites that match student's career needs.
 6. Development of individual training plans for students. These plans, based on curricula approved by the vocational-technical system, may articulate into postsecondary education. For further information about IOT, contact the State Program Manager.

Contact and Vendor Resource List

STATE OF IDAHO APPROVED VENDOR LIST

State Purchasing
Ro Gene
208.327.7465

CURRICULUM, SOFTWARE AND HARDWARE VENDORS

Marcraft

A-Plus Curriculum
Network-Plus Curriculum
Contact:
David DuRee
1620 E. Hillsboro Street
Pasco, WA 99302
1.509.547.0030
1.800.441.6006
1.509.547.8090 Fax
e-mail mcrafft@oneworld.owt.com

Heathkit

A-Plus Curriculum
Contact:
Technical Training Systems
Lab Technologies
P.O. Box 1362
Meridian, ID 83680-1362
208.884.3012
1.800.833.0422

New Horizons Computer Learning Center

A- Plus Curriculum
Contact:
Charles Sullivan, President and CEO
3200 North Lake Harbor Lane
Suite 168
Boise, ID 83703
208.368.0992

Novell

NEAP
Novell's Guide to Network-Plus
Contact: Kent Christensen
International Education Program Manager
1.801.222.7746
1-800-233-3382
Asst - Jana Cox

Microsoft

AATP Program

Contact:
Gay Robbins
v-gayro@microsoft.com

Scott Williams
Educational Sales
1.425.705.1996

Eastern Idaho Technical College

Novell/Microsoft Testing Center
VUE Testing Center
Contact:
Randy Graves
randy@www1.etic.edu

CISCO

Cisco Hardware and Curriculum
Contact:
Ron Gudapati
Account Manager
404 S. 8th Street, Suite 310
Boise, ID 83702 USA
208.331.0301
208.387.0234 Fax
1.800.365.4578 Pager
rgudapat@cisco.com

3-Com

3-Com Curriculum
Contact:
Ron Isom
Account Manager
801.320.7863
801.990.7863 Fax
ron_isom@3mail.3com.com

FutureKids

Business and Light Technical Products
Contact:
David W. McMullan
10400 Overland Road #369
Boise, ID 83709
208.321.9191

TEST REGISTRATION

Novell

To register for a **Novell** certification test call:
Sylvan at 1.800.RED.EXAM, 1.800.RED.TEST, or 1.410.880.8700

VUE at 1.800.511.8123, 1.888.834.8378, or 1.612.897.7370

Eastern Idaho Technical Center

Novell/Microsoft Testing Center
VUE Testing Center
1600 S 25th E
Idaho Falls, ID 83404
1.800.662.0261

To register for a **Microsoft** certification test contact:

Computerland

4795 Emerald
Boise, ID 83706
208.345.8024
208.345.8011 Fax

New Horizons Learning Center

3200 North Lake Harbor Lane
Suite 168
Boise, ID 83703
208.368.0992

Executrain

12426 W. Explorer Drive, Suite 190
Boise, ID 83713
208.327.0768
208.327.9589 Fax

Eastern Idaho Technical College

Novell/Microsoft Testing Center
VUE Testing Center
1600 S 25th E
Idaho Falls, ID 83404
1.800.662.0261

WEBSITE RESOURCES

Idaho Division of Professional-technical Education

<http://www.sde.state.id.us/vte>

Novell

<http://www.education.novell.com>

Microsoft

<http://www.microsoft.com>

Cisco

<http://www.cisco.com>

3-Com

<http://www.3-com.com>

Marcraft

<http://www.mic-inc.com>

Heathkit

<http://www.heathkit.com>

Network Plus

<http://www.CompTIA.org>

PROGRAM CONTACTS

Don Eshelby
Trade and Industry Program Manager
208.334.3216

Dan Petersen
Business Program Manager
Teacher Certification
208.334.3216

Cliff Green
Technical Network for Training
208.334.3216

APPENDIX A-1

The NEAP Program

APPENDIX A-1

The NEAP Program

Novell's high school partnership program, the Novell Education Academic Partner (NEAP) Secondary Program, allows high schools, secondary vocational schools, and advanced or magnet middle schools to offer Novell-authorized courses as part of their diploma or certificate program. These students can take Novell-authorized classes and become Novell certified with all training for graduation requirements.

Program Benefits

The NEAP Secondary Program is designed to help both secondary schools and students.

Schools benefit from the NEAP Secondary Program through:

- An approved partnership with Novell and opportunities to partner with local businesses.
- Large educational discounts on Novell-authorized books and classroom software.
- Use of the official Novell Education logos and course completion certificates.
- Ability to prepare students for the high-tech workforce of tomorrow
- Participation in an industry-recognized certification-driven school-to-work program.
- Utilizing networking students in supporting the school's or district's own network.

Students benefit from the NEAP Secondary Program through:

- Hands-on experience in a networking environment.
- "Real-life" marketable skills that can lead to a high-paying job right out of school.
- Reduced costs for training and certifications.
- Use of Novell-authorized books and materials.
- Added value to the high school diploma.

APPENDIX A-2
NEAP
Application Process

APPENDIX A-3

Novell 520 Class

APPENDIX A-3

Novell 520 Class

520 - IntranetWare: NetWare 4.11 Administration

Overview

Learn the basics of managing a NetWare 4 network. Course 520 teaches how to use NetWare administrative tools to set up, manage and use basic network services, including file systems, network printing, security and E-mail.

Audience

- ▶ NetWare 4 Administrators
- ▶ CNA Candidates
- ▶ CNE Candidates

Skills

- ▶ Add users to the network
- ▶ Execute network applications and share software resources
- ▶ Make accessing the network seem invisible to users
- ▶ Set up and manage the network file system
- ▶ Provide transparent access to information and resources anywhere on the network
- ▶ Use a multi-context Novell Directory Services (NDS) environment
- ▶ Set up and manage network printing
- ▶ Create effective network security
- ▶ Back up and restore NetWare server data
- ▶ Set up and manage NetWare messaging services

Topics

- ▶ Basic Network Services
- ▶ Workstation Environments
- ▶ Login Scripts
- ▶ NetWare Application Manager
- ▶ Network Printing
- ▶ NetWare Administrator Utility
- ▶ File System Management
- ▶ NDS
- ▶ Directory Objects and Resources
- ▶ NDS Security
- ▶ Server Console Commands
- ▶ NetWare Loadable Modules™
- ▶ Administrative Tasks

Certification Information

- ▶ CNA - NetWare 4
- ▶ CNE - GroupWise 4
- ▶ CNE - GroupWise 5
- ▶ CNE - NetWare 4
- ▶ Novell Certified Internet Professional

Test Information

- ▶ 50-613: All Novel Certifications; *see Progress Charts*
- ▶ 50-813: Instructor Level

Related Courses

- ▶ IntranetWare: NetWare 4.11 Advanced Administration - *525*
- ▶ IntranetWare: NetWare 3 to NetWare 4.11 Update - *526*
- ▶ IntranetWare: NetWare 4.11 Installation and Configuration Workshop - *804*
- ▶ *535*

Language

- ▶ English

APPENDIX A-4

Novell 560 Class

APPENDIX A-4

Novell 560 Class

560 NetWare 5 Administration

Course Overview

This course is designed to provide students with the necessary knowledge and skills to perform competently in the role of network administrator or system manager for NetWare 5. Students completing this course will be able to accomplish fundamental network management tasks on a NetWare 5 network.

Audience

This course is intended for students interested in gaining their Certified Novell Administrator (CNA) and Certified Novell Engineer (CNE) certifications.

Certification Information

This course is intended for the NetWare 5 Certified Novell Administrator (CNA) and the Certified Novell Engineer (CNE) candidate.

Test Information

Certification test names and numbers are as follows:

- CNA Test: TBD
- CNE Test: TBD
- CNI Test: TBD

APPENDIX A-5

AATP Program

APPENDIX A-5

The AATP Program

The Microsoft Authorized Academic Training Program allows academic institutions to deliver training on Microsoft® technology to their student community. This training prepares students for industry-recognized certification by using authorized materials and curriculum designed for the Microsoft Certified Professional (MCP) Program.

The audience for this training is those who wish to polish their skills or to become network administrators, programmers, and system managers. This program teaches students how to develop, support, and integrate computing systems with Microsoft products such as the Visual Basic® programming system, the Visual C++® development system, the Windows® 95 operating system, and the BackOfficeT family of products including the Windows NT® operating system. It also helps students prepare for Microsoft Certified Professional exams. By passing these exams, your students can earn a marketable and industry-recognized credential that validates their technical proficiency with Microsoft products. To learn more about the value of the MCP Program, visit our Web site at: http://www.microsoft.com/train_cert/ or send e-mail to mcp@msprograms.com or call (800) 636-7544. Through AATP, your school can deliver technical training on Microsoft technology that meets the employment demands of your community and the global technology marketplace.

APPENDIX A-6
AATP
Application Process

APPENDIX A-7

Microsoft 803 Class

APPENDIX A-7

Microsoft 803 Class

Administering Microsoft Windows NT 4.0 **Course No. 803**

This course provides students with the knowledge and skills necessary to perform post-installation and day-to-day administration tasks in a single-domain or multiple-domain Microsoft Windows NT based network. It also provides students with the prerequisite knowledge and skills required for course 687, *Supporting Microsoft Windows NT 4.0 – Core Technologies*, and course 694, *Microsoft Windows NT – Technical Support* self-paced training.

At Course Completion

At the end of the course, students will be able to create and administer user and group accounts by possessing the ability to determine account policies; troubleshoot problems that prevent users from logging on to the network; manage network resources; set up and administer permission for files and folders; take ownership of folders; and troubleshoot when users are unable to gain access to disk resources. Students will also be able to set up a printing environment, administer printers, and troubleshoot why a user cannot print; use auditing functions to generate and view security logs; monitor network resources to track usage and disk space; back up and restore files and folders using tapes; and administer the Windows NT Server and Windows NT Workstation operating systems in real world situations.

Microsoft Certified Professional Exams

This course, along with course 687, helps you prepare for the following Microsoft Certified Professional exams:

- *Administering Windows NT 4.0* self-administered assessment
- Exam 70-73: *Implementing and Supporting Microsoft Windows NT Workstation 4.0*
- Exam 70-67: *Implementing and Supporting Microsoft Windows NT Server 4.0*

Course Materials and Software

The course workbook and lab book are yours to keep. You will be provided with the following software for use in the classroom:

- ! Microsoft Windows NT Server version 4.0

APPENDIX A-8

Microsoft

922 Class

APPENDIX A-8

Microsoft 922 Class

Supporting Microsoft Windows NT 4.0 **Course No. 922**

This course provides the core foundation for supporting Microsoft Windows NT Operating System Version 4.0. The goal of this course is to provide support to professionals with the skills necessary to install configure, customize, optimize, network, integrate, and troubleshoot Windows NT 4.0.

Content primarily of interest in a complex environment – such as capacity planning on a server and a network, multiple domain management, and trust relationships – is covered in depth in a series of courses that make up the *Microsoft Windows NT Enterprise Series*. Content specific to administration of the Windows NT Server network operating system can be found in the *Administering Microsoft Windows NT 4.0* Course.

At Course Completion

At the end of the course, students will be able to describe the system strategy for Windows NT 4.0; install and configure Windows NT; create and implement system policies; create and manage partitions, file systems, and fault-tolerant volumes; support running applications under Windows NT; identify network components and describe their function on a Windows NT based computer; install and configure network transport protocols; install and configure network services on Windows NT Server; implement remote access service (RAS); install and configure Microsoft Internet Information Server and Services for NetWare; install client software; implement and troubleshoot directory replication; recognize problems related to the boot process; and determine the appropriate action to take for common problems.

Microsoft Certified Professional Exams

This course helps you prepare for the following Microsoft certified professional exams:

- 70-67: *Implementing and Supporting Microsoft Windows NT Server 4.0*
- 70-73: *Implementing and Supporting Microsoft Windows NT Workstation 4.0*

Course Materials and Software

The course workbook, lab book, and Student Material compact disc are yours to keep. You will be provided with the following software for use in the classroom:

- Microsoft Windows NT Server version 4.0
- Microsoft Windows NT Workstation version 4.0
- Microsoft MS-DOS 6 or later

APPENDIX A-9

CISCO Program

APPENDIX A-9

The Cisco Program

The Cisco Networking Academies program consists of four semesters (see Unit three). This course is designed to give students the opportunity to learn the skills needed to design, build, and maintain small to medium-size networks. This training will provide them with the opportunity to enter the workforce and/or further their education and training in the computer networking field.

To apply to be a Cisco Academy you will need to contact Ron Gutapati at 208-331.0301 or visit the Cisco Website at www.cisco.com.

APPENDIX A-10

CISCO

Application Process

APPENDIX A-10

CISCO Application Process

The Cisco Networking Academies program consists of four semesters (see Unit three). This course is designed to give students the opportunity to learn the skills needed to design, build, and maintain small to medium-size networks. This training will provide them with the opportunity to enter the workforce and/or further their education and training in the computer networking field.

Application for CISCO Academy must be done on-line at the CISCO Website at www.cisco.com. or contact Ron Gutapati at 208-331-0301.